CONTROLLING THE HOME APPLIANCES USING BRAIN WAVE TECHNOLOGY

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Abstract: This project discussed about A brain-computer interface (BCI) is a new communication channel between the human brain and a digital computer. The ambitious goal of a BCI is finally the restoration of movements, communication and environmental control for handicapped people. An electroencephalogram (EEG) based brain-computer interface was connected with a Virtual Reality system in order to control a smart home application. It offers an alternative to natural communication and control.

Keywords: ***EEG; home control.***

I. INTRODUCTION

Different brain states are the result of different patterns of neural interaction. These patterns lead to waves characterized by different amplitudes and frequencies. This neural interaction is done with multiple neurons. Every interaction between neurons creates a minuscule electrical discharge. This project dealing with the signals from brain. The signal generated by brain was received by the brain sensor and it will divide into packets and the packet data transmitted to wireless medium (blue tooth).the wave measuring unit will receive the brain wave raw data and it will convert into signal using MATLAB gui platform. Then the instructions will be sending to the home section to operate the modules (bulb, fan). The project operated with human brain assumption and the on off condition of home appliance is based on changing the muscle movement with blinking

BLOCK DIAGRAM:

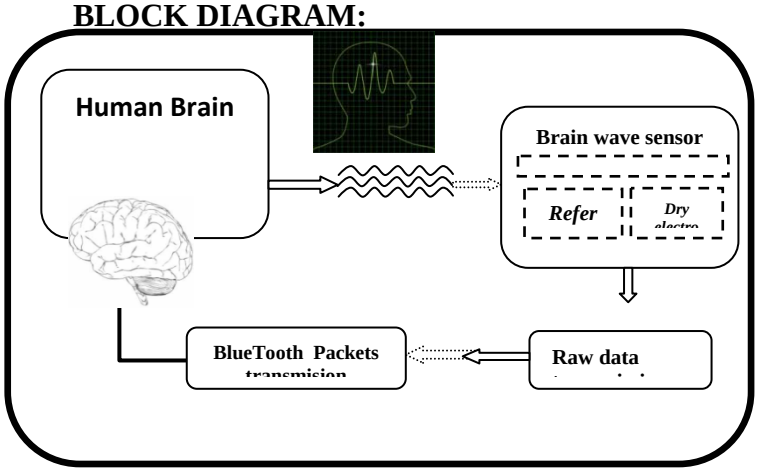

Fig a: Brain computer interface section

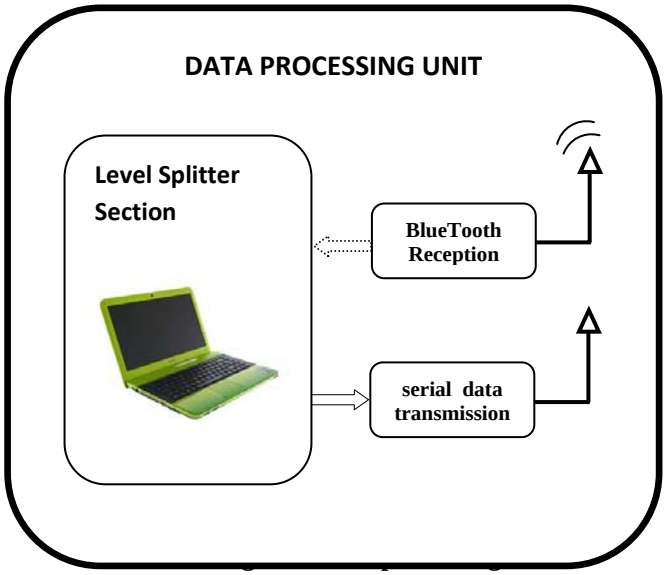

Fig b: Data processing unit

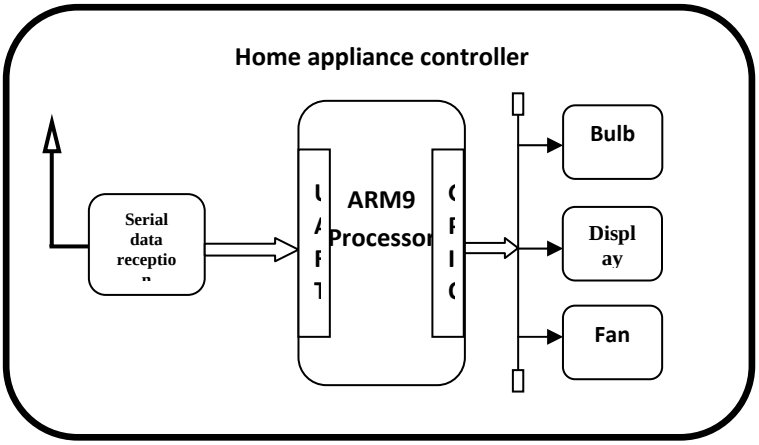

Fig c: home section

This project work consists of a Processor using ARM9 core, brain wave sensor and alert unit obstacle detection unit as hardware parts and an effective brain signal system using Mat lab platform. In this project initially the person's attention level or else the blinking level should be found out by the brain wave sensor. Whenever a person is entered into home, the brain wave sensor unit will calculate the blinking level and it will compare with the minimum attention levels of human when ever not sleeping. The blinking levels will equal the set point then automatically vehicle will move without any problem. In case if the blinking levels will cross the set point, then the bulb or fan will on. Most case, we can compare the owner's blinking levels with stored blinking levels. Now, the owner have to check whether the devices on or not.

II . DESIGN AND IMPLEMENTATION

This project uses two important platforms. 1. Coding Platform and 2. Execution Platform. These platforms are discussed below

Coding Platform:

In this project a brain computer interface system is used which will do the key role in the entire operation. For the BCI system, we are using the MATLAB and for brain wave sensor and Processor communication neurosky is used.. The BCI will process in the following way.

For calculating the blinking levels we need to use a brain wave sensor support a neuro sky product which is called mindo4 Initially we have to take the data from the brain by using neurons postion and should store in the brain wave sensor. The supportable

sensor in the MATLAB is given in the form of the following data function

connectionId1 =calllib('Thinkgear','TG_GetNewConnectionId');

Initially we need to check that sensor is connected or not. The mind wave sensor software will provide the information about the sensor connection. If the sensor is connected we are entering in to the MATLAB section for checking the blinking levels of person.

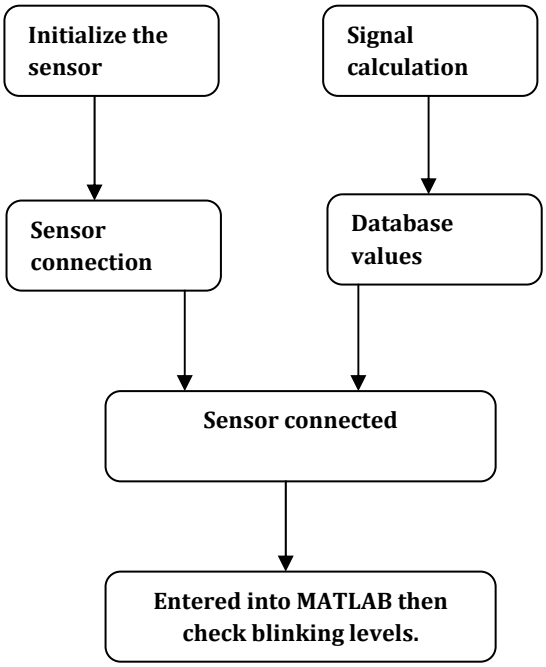

Fig b: BCI Software architecture

Once the blinking levels will calculated it will be send to MATLAB. Whenever MATLAB reads an blinking values it will convert into digital values because for micro controller understanding purpose the values should be in digital format. After calculating the blinking values ,we need to check whether it will cross the set point in the database . As an acknowledgement we will get the following help dialogue.

```
if(data_BLINK (j) > 90)
                if(Drive mode == 1)
                   fopen(serial One);
                   fopen("Blink.exe");
                   fclose (serial One);
                        End
```

Then pre-processing will be done within the blinking levels and the database values which involves , Similarity checking and probability finding. Here similarity checking is nothing but the comparison between two blinking values by calculating the change between the input and data base values. Then the result will be shown on the MATLAB.

```
if(data_BLINK (j) > 90)
   %              if(Drive mode == 1)
                   fopen (serial One);
                   fwrite (serialOne,'Q');
                   fclose(serial One);
   %              end
            end
```

Drowsiness, eyes open and eyes closed are closely connected to alpha activity. once sleepiness forces the eyes to shut, alpha waves are strongest encephalogram brain signals have reported that in sleepiness state alpha activity mainly seems in os space and particularly magnitude of alpha2 wave like a better alpha band (11~13Hz) increases. However, supposing traditional adults have their eyes open notwithstanding they drowse, alpha

changes of can't be explain one thing logically.

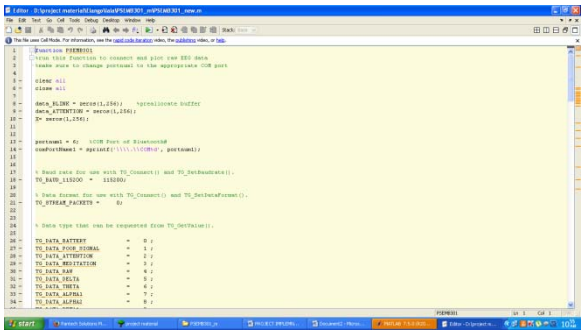

Fig c : BCI running image

Execution Platform:

This half consists of ARM core processor as a main unit, Brain wave device system, Ignition unit, PC , alert section and a show unit. This modules with coming up with and implementation technique is given below.

ARM processor is employed for dominant the system. Here we have a tendency to square measure victimization the LPC2929 series, which has 2 UART. In UART0 we'll interface the once ARM processor receives a command 'Q' through UART1, then the processor can move the motive force circuit. attributable to this the engine are going to be move instantly. Next, if the processor receive a command 'X' , then UART0 receiver interrupt are going to be enabled. So, this worth within the information base can compare mechanically the motive force management unit can stop. This interrupt routine code are going to be checked by the processor endlessly that will increase the potency of the project. These interrupt checking technique must tack the vector address. that the vector address configurations for each UART square measure given below. The Vectored Interrupt Controller (VIC) takes thirty two interrupt request inputs and directly programmable assigns them vectored IRQ. VICIntSelect may be a register that have the management of all interrupt registers. As we have a tendency to square measure victimization the UART0 interrupt and UART1 interrupt we've to simply modify the sixth and seventh little bit of the VICIntSelect register. When facultative for every interrupts separate slot ought to be enabled for process. thus whenever associate interrupt is returning from the device, then ARM processor will directly jumb to the interrupt routine to process the command.. due to this facility ARM will handle the various interrupts from the device and might do the individual functions with none fault.

during this project the engine unit are going to be controlled by a driver circuit. the motive force circuit consists of a driver unit, electrical device and a semiconductor unit. If the automobile is started, the engine are going to be turned ON which implies ARM processor can offer the bias voltage to the semiconductor unit to modify on the relay that successively activate the automobile engine. meantime the processor can check the interrupt routine. Once if it receives the interrupt 'X' through UART then the processor can cut the bias voltage to the semiconductor unit. So that, the engine are going to be turned off.

Wireless Platform:

a)BCI system:

The main purpose of the current chapter is to review recent advances within the EEG field. to grasp these developments it'll initial be necessary to detail the physiological basis of the EEG signal. after, vital problems related to knowledge acquisition, signal process, and quantitative analyses are going to be mentioned . the most important portion of the chapter are going to be dedicated to reviewing rising supply localization techniques that are shown to localize EEG activity while not postulating a priori assumptions concerning the amount of underlying sources. As we are going to discuss, maybe the best advancements within the EEG field within the last 5-10 years are achieved within the development of those localization techniques, especially once utilized in concert with high-density EEG recording, realistic head models, and different purposeful neuroimaging techniques.

.The time unit temporal resolution of electroencephalogram permits scientists to analyze not solely fluctuations of electroencephalogram activity (i.e., increases/decreases) as a operate of task demand or subject samples however conjointly to differentiate between practical repressive and excitant activities.low frequencies (e.g., delta and theta) show massive synchronal amplitudes, whereas electroencephalogram frequencies (e.g. beta and gamma) show tiny amplitude owing to high degree of asynchrony within the underlying somatic cell activity. In adults, the amplitude of normative electroencephalogram oscillations lies between ten and a hundred (more ordinarily between ten and fifty; Niedermeyer, 1993). within the following section, a quick review of varied electroencephalogram bands and their supposed practical roles are going to be given. The review of the muscular and physiological basis underlying the generation of varied electroencephalogram oscillations

Fig d : Sensor status indicator

III. Conclusion

This project dealing with the signals from brain. Different brain states are the result of different patterns of neural interaction. These patterns lead to waves characterized by different amplitudes and frequencies. The signal generated by brain was received by the brain sensor and it will divide into packets and the packet data transmitted to wireless medium (blue tooth).the wave measuring unit will receive the brain wave raw data and it will convert into signal using MATLAB gui platform

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